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Sugar Maple

An American Wood

Sugar maple is a wide-ranging and important hardwood tree—a component of 23 forest types in the United States and Canada. It provides a considerable source of food and cover for wildlife, but is not particularly susceptible to animal or bird damage or the ravages of insects. The sugar maple (fig. 1) is the most consequential of the 13 maple species native to the United States. The heartwood is normally a light reddish brown, hard and strong. It takes a high polish and stains well, thus making it suitable for hardwood floors and furniture. The wood is also used for many varied purposes ranging from scientific instruments to clothespins. Maple syrup and sugar are also valuable products.

Figure 1.—An open-grown sugar maple tree. **F-481314**

NOTE: This publication supersedes the sugar maple portion of "Maple," unnumbered American Woods leaflet, 1959.

Sugar Maple
(*Acer saccharum* Marsh.)

Edwin Kallio and Carl H. Tubbs[1]

Distribution

Sugar maple (*Acer saccharum* Marsh.) is an important hardwood tree of the Eastern United States and Canada. Its northern range limit closely parallels the 35th mean annual isotherm, which runs through southern Quebec and Ontario and northern New Brunswick. Its southern limit is less well defined; however, the species is seldom found as far south as the South Atlantic States or the Gulf Coastal Plains (fig. 2). The greatest concentrations of sugar maple are found in the northern part of its range in Wisconsin, Michigan, Pennsylvania, New York, the New England States, and southeastern Canada. In the United States, New York and Michigan have the greatest volumes of sugar maple. Concentrations of sugar maple in the South are confined to the Appalachian Mountains.

Description and Growth

Under forest conditions, sugar maple develops a clean, straight stem and, at maturity, attains a height ranging from 70 to 110 feet. The branch-free portion of forest-grown tree stems is commonly 30 to 40 feet high, but can reach 70 feet. Crowns of isolated trees may start as low as 4 or 5 feet from the ground. In mature trees, the diameter at breast height (d.b.h.), which is 4-1/2 feet from the ground, ranges from 2 to 3 feet. Trees with diameters as great as 5 feet have been found. Root systems are shallow and widespread. Mature trees commonly live for 200 years and some may live for more than 400 years.

The leaves of sugar maple are 3 to 5 inches in diameter and usually five lobed. The lobe margins and surfaces are smooth (fig. 3). Twigs are brownish and shiny. Both lateral and terminal buds are sharply pointed and brown. Lateral buds are on opposite sides of the twig. The leaves of the similar red maple (*Acer rubrum* L.) have serrated lobe margins and reddish, rounded buds. Black maple (*Acer nigrum* Michx. f.) leaves are usually three lobed and pubescent. The bark of sugar maple is grey and becomes deeply fissured on mature trees (fig. 4).

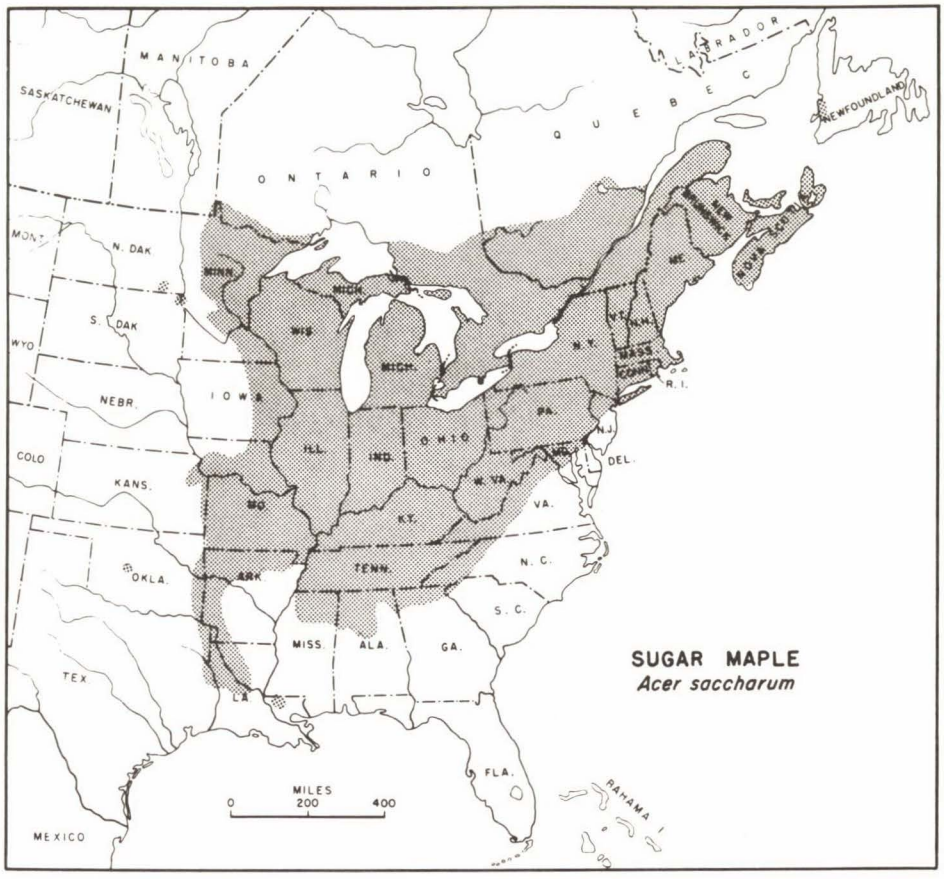

Figure 2.—Natural range of sugar maple. F-452056

Both perfect and unisexual flowers are found on the same tree. These yellow flowers are generally pollinated by bees and other insects. The fruit, a double samara (fig. 3), ripens from late summer to early fall and is dropped during leaf fall. Usually, only one of the samaras in a pair produces a viable seed. Good seed production occurs at 2- to 8-year intervals.

Seeds germinate during the spring following dispersal. Seedlings are very shade tolerant and often survive dense forest conditions for many years. They grow rapidly when overstory trees are cut or die.

Figure 3.—Sugar maple leaves and seeds. F-490971

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Its long life, tolerance of shady environments, and prolific seed production make sugar maple a prominent species in both overstories and understories, particularly in plant communities in the latter stages of succession. Sugar maple is a component of 23 forest types. In six of these, it is a major species. Commonly associated species are American beech, yellow birch, basswood, black cherry, red spruce, and eastern hemlock. In southerly areas, sugar maple grows with oaks and other species of the mixed-hardwood forest.

Sugar maple is genetically highly variable. Two ecotypes or physiological races of sugar maple are known. One ecotype occupies the Central States and is more resistant to high temperatures and drought than the ecotype found over the rest of the range. Continuous variations in some characteristics have also been observed. For example, growth of northern trees starts earlier and ends earlier than growth of trees of southern origin. Winter hardiness is an example of a characteristic that is relatively uniform throughout the range.

Because sugar maple has such a wide range and grows in such a variety of communities, it is difficult to generalize about its relationship to soils and topography. Generally, sugar maple reproduces and grows well in a wide variety of soils and topographic situations, but is usually most numerous on well-drained soils. It is virtually excluded from the wettest and driest sites. Further north, it is more common on warmer sites. To the south, it is more common on cooler, less exposed sites or at higher elevations.

Insect attacks and diseases seldom kill sugar maples. Occasionally, however, combinations of unfavorable weather and defoliating insects have caused severe mortality in limited areas. Generally, the greatest impact of both insects and diseases is on quality or growth. Defoliating insects can reduce growth, bud miners can cause forking, and boring insects can cause defective logs.

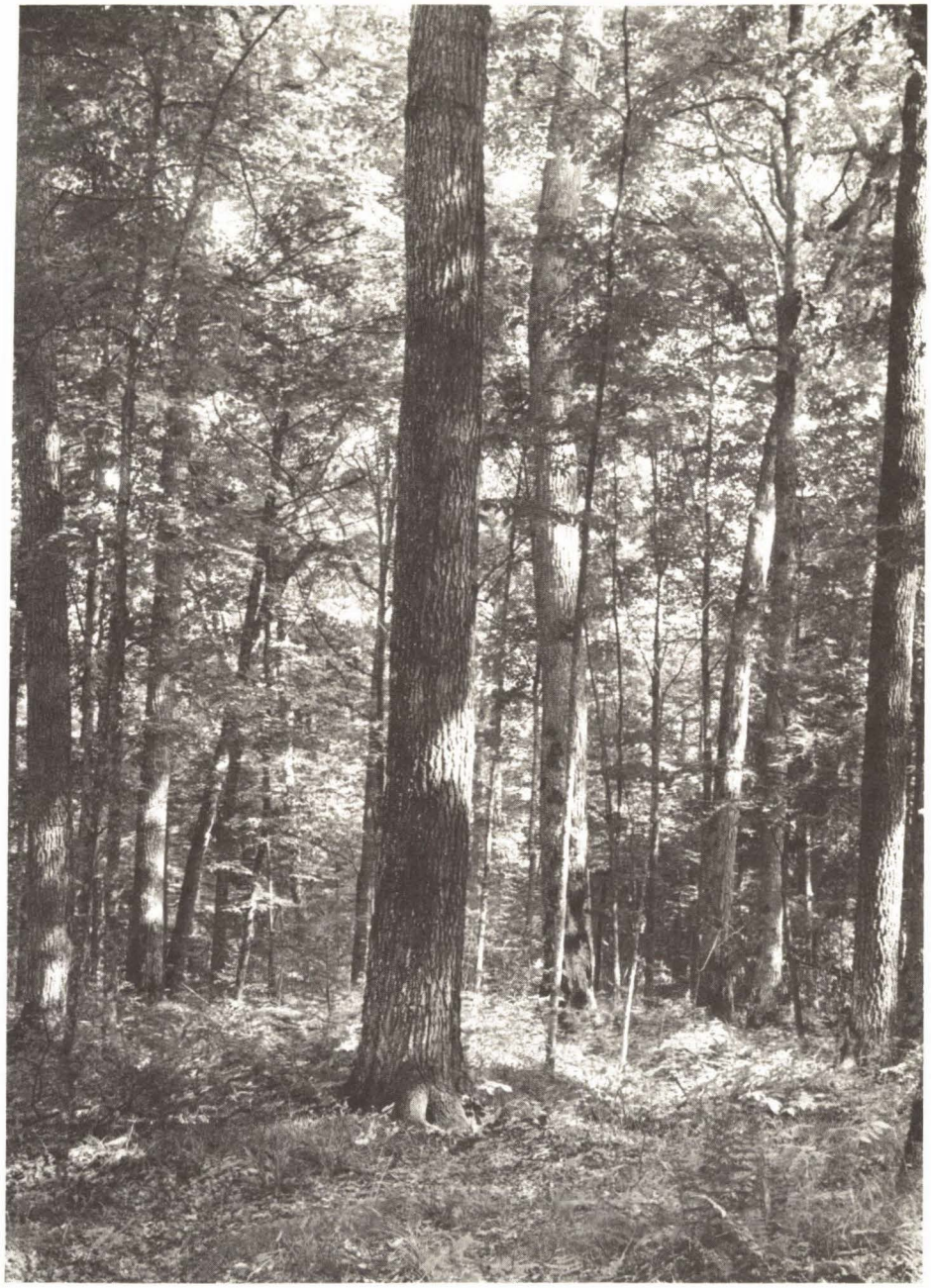

Figure 4.—Mature sugar maple tree on the Nicolet National Forest, Wisconsin **F–401469**

Many organisms that cause discoloration, decay, and cankers infect sugar maple; however, these organisms are seldom direct causes of mortality. Wilt diseases are direct causes of mortality, but only account for minor losses. Diebacks of crowns are fairly common in both forest and shade-tree areas. In forests, diebacks are caused by variations in the weather, animal and bird damage, or exposure; but such diebacks seldom result in mortality. Shade trees are susceptible to damage by road salt, soil compaction, nutrient

deficiencies, restricted root zones, and air pollution. Dieback and mortality of trees may result from one or several of these factors.

Sugar maple is an important source of food and cover for wildlife, but is not seriously damaged or killed by either animals or birds except in limited situations. Attacks by the yellow-bellied sapsucker can cause serious degrade of logs.

Young sugar maples are sensitive to spring fires, which cause severe mortality. However, wildfires are not common in sugar maple stands because of the high moisture content of the forest litter.

Common Names

Acer saccharum Marsh. is usually called sugar maple although hard maple and rock maple are also commonly used names.

Related Commercial Species

Other than sugar maple, the red maple, silver maple, black maple, box elder, and bigleaf maple are of commercial importance. Except for bigleaf maple, which grows only on the West Coast, these maples grow in the Eastern United States and southeastern Canada. The ranges of the eastern maples are fairly similar in extent except for black maple, which is most abundant in the Central and Mid-Atlantic States.

Supply

Sugar maple is the most important commercial species of the 13 maples of the genus *Acer* that are native to the United States. Black maple (*Acer nigrum*) differs so little from sugar maple that most foresters treat it as a variety of sugar maple. The statistics in this publication will cover both species because they are often combined into one category (hard maple). The maple-beech-birch type in which sugar maple is most numerous covers 31 million acres or 9 percent of all hardwood-forest land in the Eastern United States. New York and Michigan each have about one-third of their forest cover in this type; Maine has about one-fifth. The net volume of sugar maple sawtimber is about 26 billion board feet or 6 percent of the total sawtimber volume in the Eastern United States. Michigan has about 6.5 billion board feet, New York has 4 billion, Maine about 3 billion, and Wisconsin about 2 billion. Nearly all of the better quality timber is found in the Lake, Mid-Atlantic, and New England States. The total volume of all live merchantable sugar maple trees larger than 5 inches d.b.h. is about 12 billion cubic feet. The States of New York, Michigan, and Pennsylvania contain half of this volume.

Production

In 1976, 172 million cubic feet of sugar maple growing stock was harvested in the United States, including 640 million board feet of sawtimber. This was 4 percent of all hardwood growing stock cut that year. More than half of the sugar maple cut came from the Northeastern Region (New England and Middle Atlantic States).

The harvest from sugar maple growing stock for all products in 1976 was 6 percent more than in 1970. The sawtimber harvest decreased 3 percent during the same period, with most of this decrease occurring in the North Central Region (Lake States and Central States). The trend during the past 14 years has been to increased use of sugar maple timber for sawlogs and pulpwood. Although no statistics are presently available, the use of sugar maple for fuelwood also increased substantially between 1976 and 1979.

Characteristics and Properties

The sapwood of the sugar maple is white with a reddish tinge and 3 to 5 or more inches thick. The heartwood is a uniform light reddish brown, but sometimes is considerably darker. The wood is without characteristic odor or taste and is generally straight-grained with a uniform texture, but can also have "birdseye," "curley," or "fiddleback" grain. The wood is heavy (specific gravity = 0.52 green, 0.62-0.68 ovendry), hard, very strong in bending, and strong in endwise compression. It is high in shock resistance, works well with tools, and is resistant to abrasive wear. It can take a high polish; takes stain satisfactorily; and, although high in nail-holding ability, it splits readily. The gluing qualities of sugar maple are intermediate. It dries easily, shrinks moderately, and is below average in ability to stay in place. It has low resistance to decay.

Principal Uses

About half of the sugar maple that is cut is used for lumber. Most of this lumber is manufactured into hardwood dimension, flooring, furniture, toys, and sporting goods. The remaining lumber is used mostly in the manufacture of machinery (textiles, printing, food products, agriculture, etc.), instruments and related products

Sugar maple growing stock and sawtimber harvested on commercial forest land in the United States in 1962, 1970, and 1976

Timber supply region	Volume of sugar maple harvested					
	All growing stock (Million cubic feet)			Sawtimber (Million cubic feet)		
	1962	1970	1976	1962	1970	1976
Northeast	71	91	95	272	331	338
North Central	54	65	70	214	306	278
South	5	7	7	19	26	24
Total	130	163	172	505	663	640

(professional, scientific, and controlling instruments; photographic and optical goods; and clocks), musical instruments, footware cut stock, boxes and crates, woodenware, novelties, butcher's blocks, clothespins, knife racks, ladder rungs, rulers, surveying rods, general millwork, tool handles, and railway ties.

During 1976, about 25 million board feet of sugar maple logs were converted into veneer in the North Central and Northeastern Regions. This was a 30-percent increase from 1972 production. Data for 1965 shows that about one-fourth of all the maple veneer produced in the United States went into wood household furniture. Other important uses were for containers, toys and sporting goods, musical instruments, and millwork.

Some of the specific applications for sugar maple veneer are bushel baskets, bass fiddle backs, guitar panels, drums, bowling pins, auditorium seats, golf club driver heads, die blocks for printing presses, pattern stock for shoe manufacturers, candy and gum racks, table tennis paddles, and tennis rackets. Sugar maple plywood is also used for furniture manufacture, wood containers, professional and scientific instruments, and millwork. An increasing amount of sugar maple is being used for home heating fuel. In general, the use of sugar maple for chemical wood has been declining and the use for pulping has been increasing during the past 10 years. Minor uses of sugar maple include fence posts, mine timber, and piling.

Maple syrup and sugar are important products from sugar maple trees, especially in Vermont and other New England States. Athough production of maple syrup is only a fraction of what it was in the early 1900's, yearly production has been relatively uniform for the past 15 years, even though there are fewer producers. With improved production techniques and the number of large producers increasing, the maple industry can be expected to continue to utilize at least 3 percent of the sugar maple resources for sap production.

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